

Survey of the physics landscape and attempts to improve diversity

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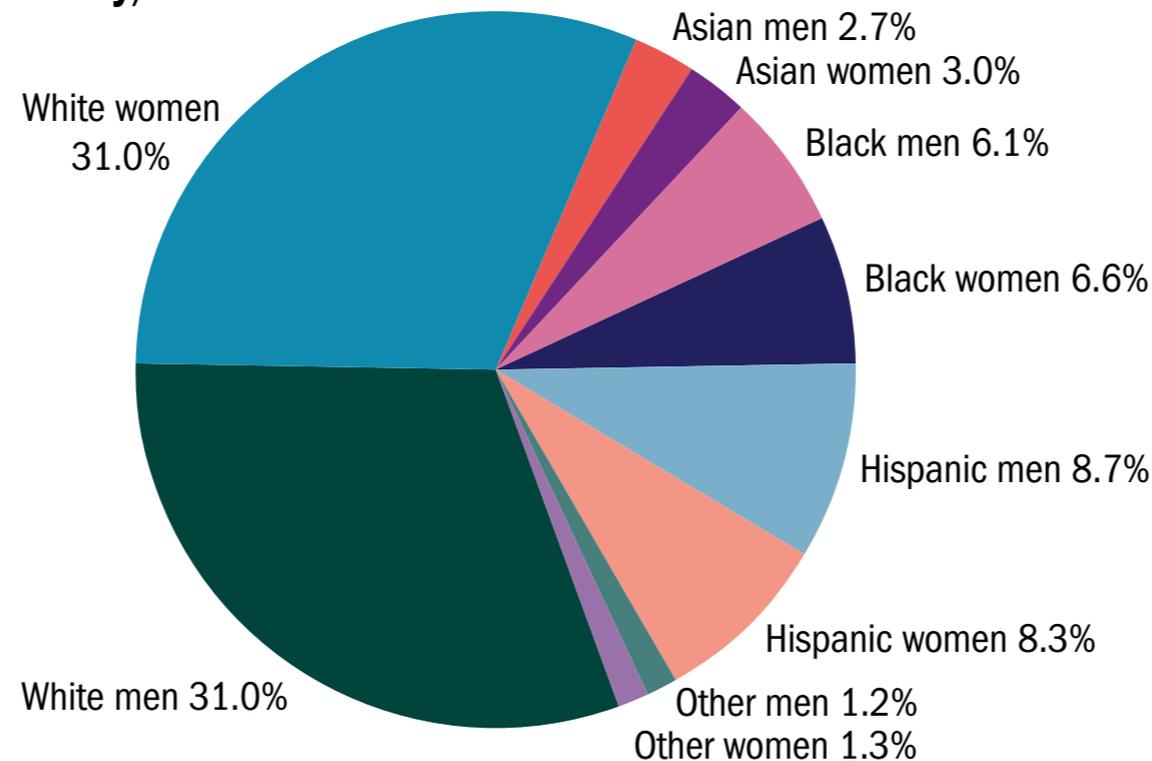
APS DPF Meeting, August 3, 2017

Population

Women and URM make up a substantial portion of the US population

- Women are about 50%, Hispanics, 17%, black 13%, Asian, 6%, (American Indian, Alaskan Native, Native Hawaiian, Pacific Islander, and those who reported more than one race 2%). (URM ~ 35%)

Noninstitutionalized resident population of the United States ages 18-64, by race, ethnicity, and sex: 2014

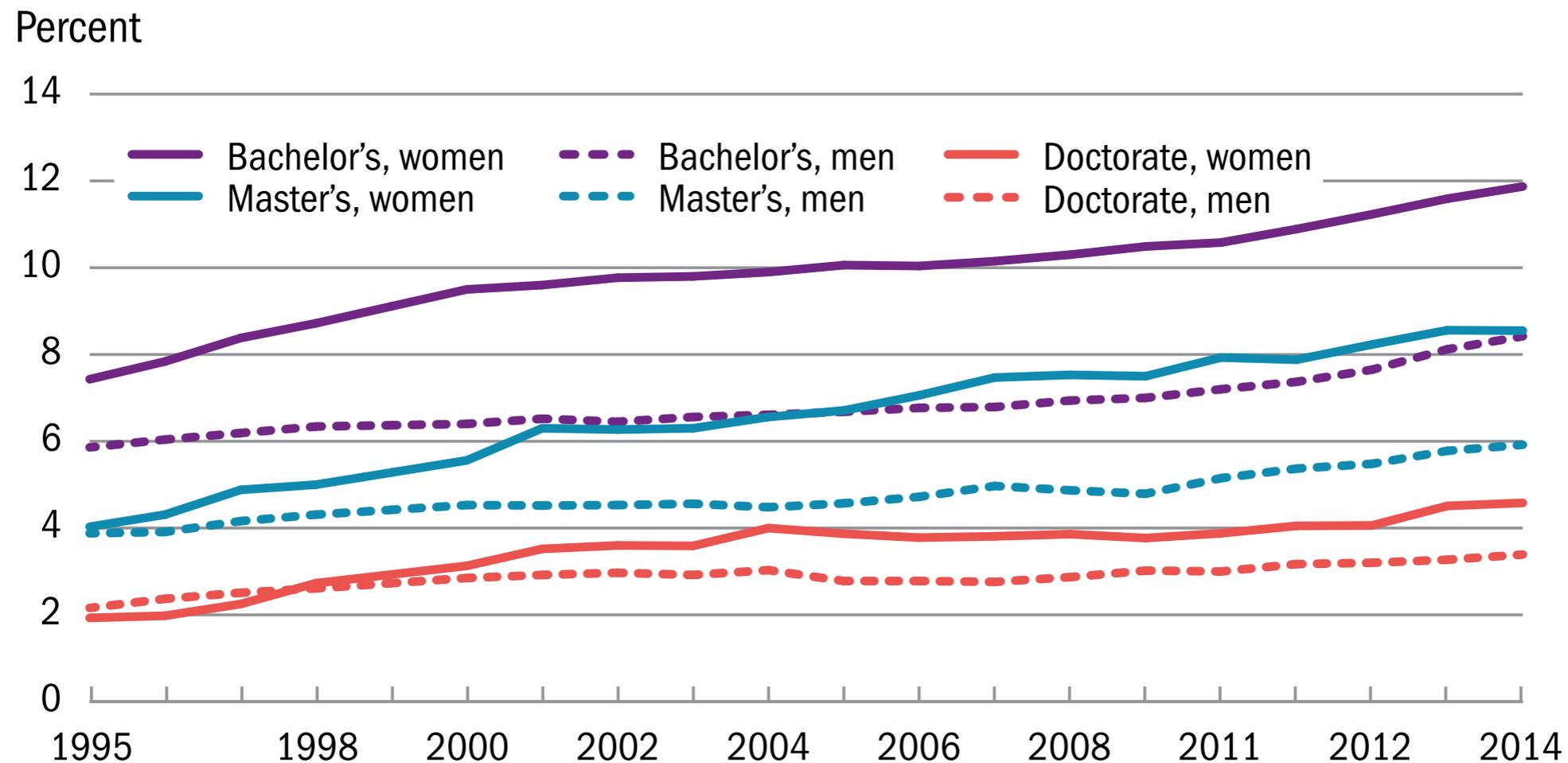


NOTES: Hispanic may be any race. Other includes individuals not of Hispanic ethnicity who reported more than one race or a race not listed separately.

Representation in physical sciences

Underrepresented Minority (URM): Statistically underrepresented group in a field and that is not representative of population. For this talk, the URM is Hispanic-, African-, and American Indian, Alaskan Native, Native Hawaiian, and Pacific Islander

Science and engineering degrees earned by underrepresented minority women and men: 1995-2014

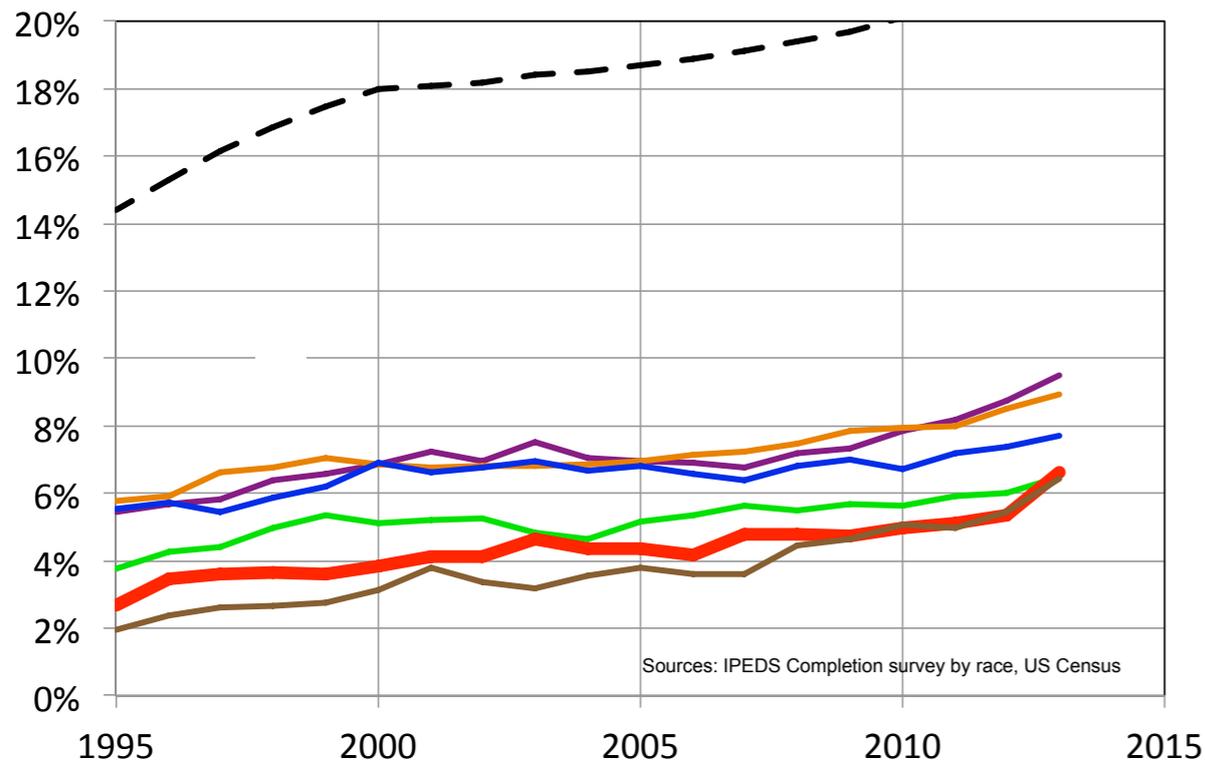


NOTE: Data not available for 1999.

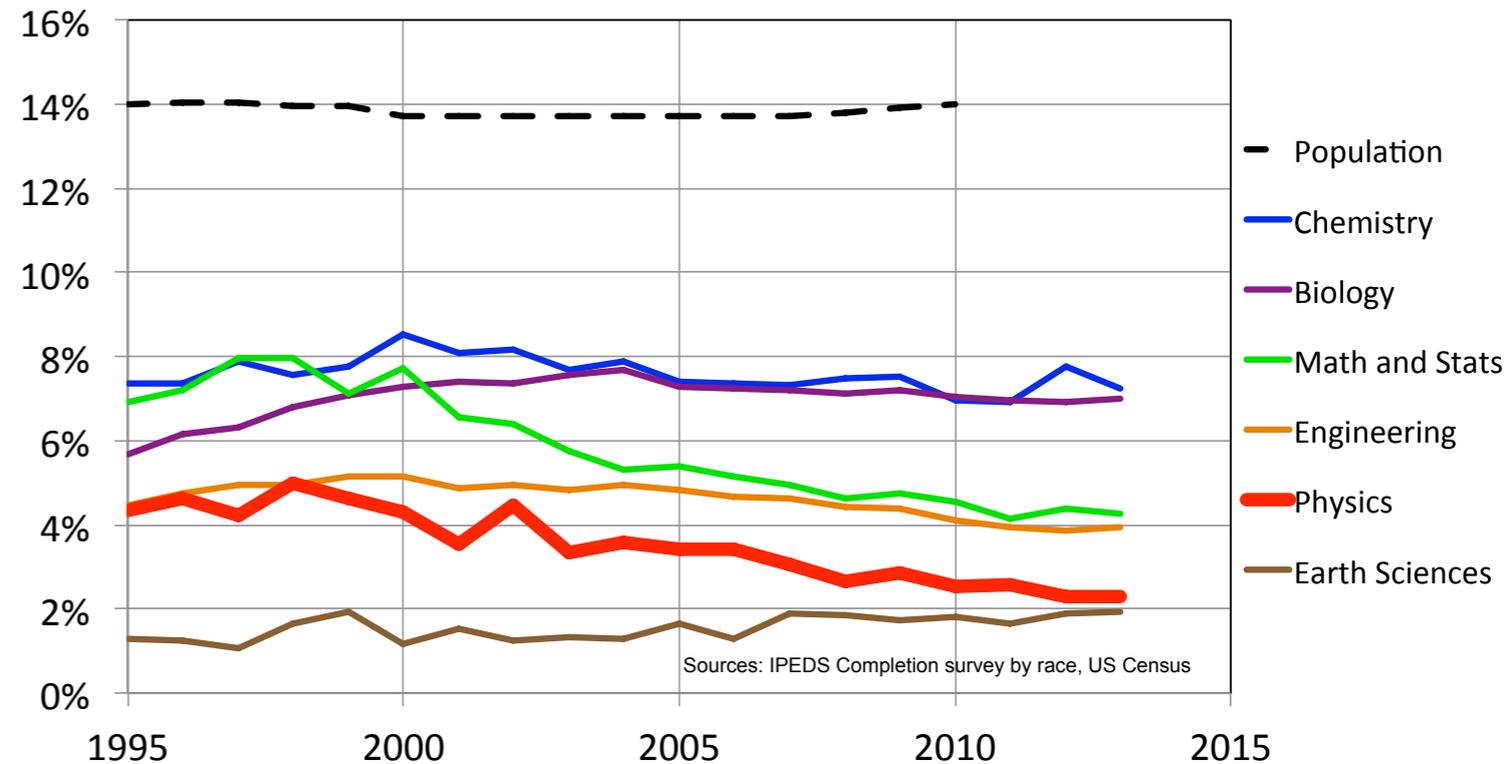
Bachelor's degrees earned by Hispanic -, African Americans in physical science fields

Hispanic American and African American physics BS accounts for 2-3% of earned degrees, respectively. Native American physics BS is roughly 0.5%.

Percentage of BS degrees earned by Hispanic Americans by major



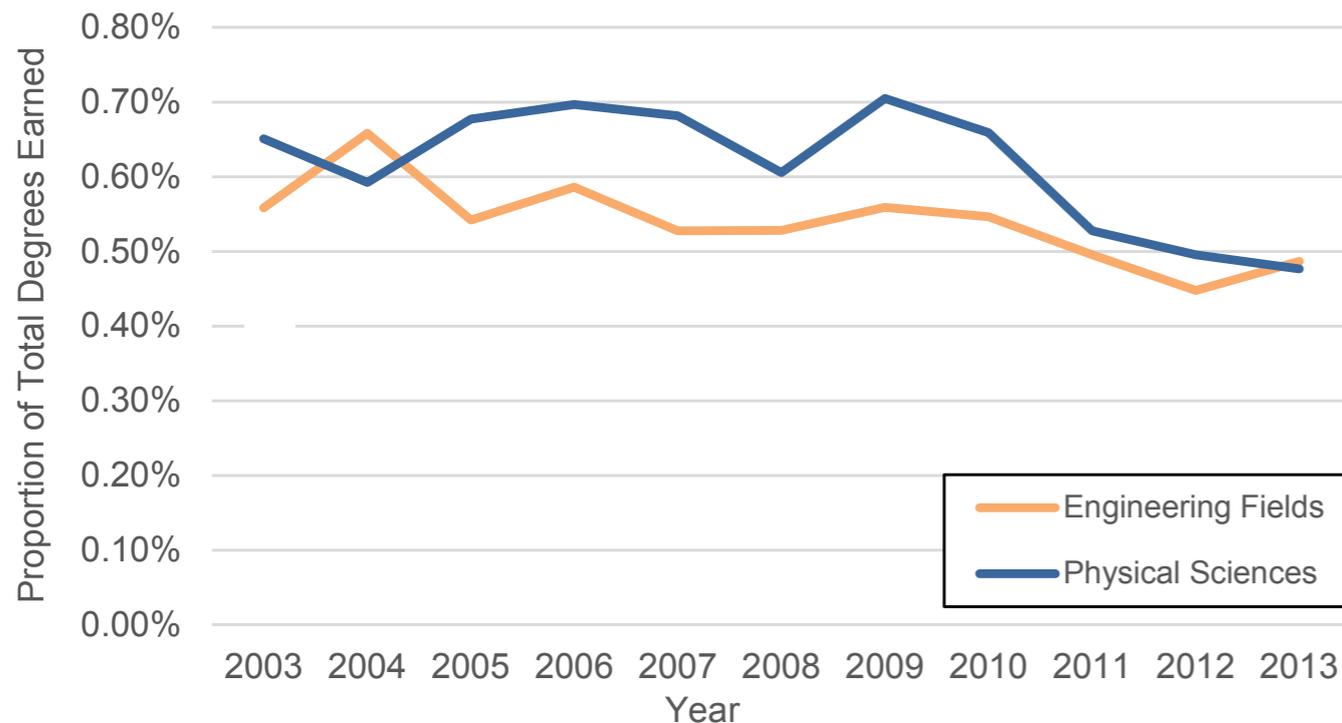
Percentage of BS degrees earned by African Americans by major



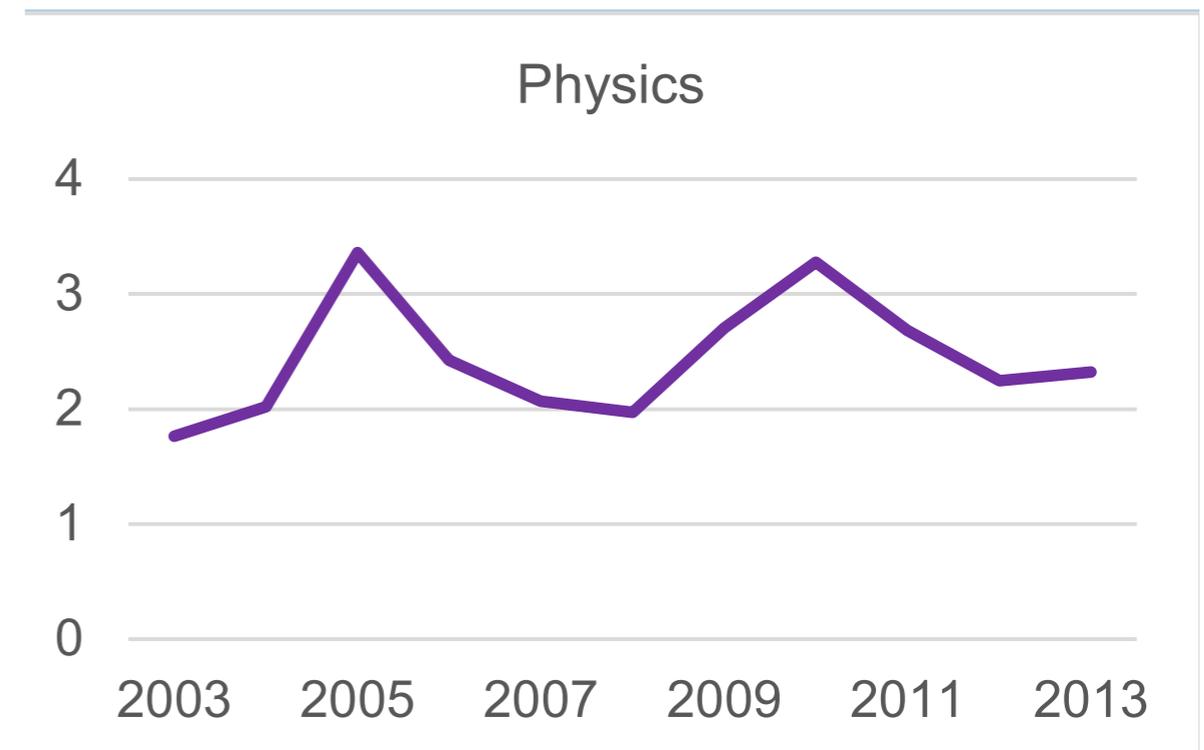
Bachelor's degrees earned by Native Americans in physical science fields

Hispanic American and African American physics BS accounts for 2-3% of earned degrees, respectively. Native American physics BS is roughly 0.5%.

Percentage of engineering and physical science
BS degrees earned by Native Americans



Number of physics degrees earned by
Native Americans per 1000 degrees earned



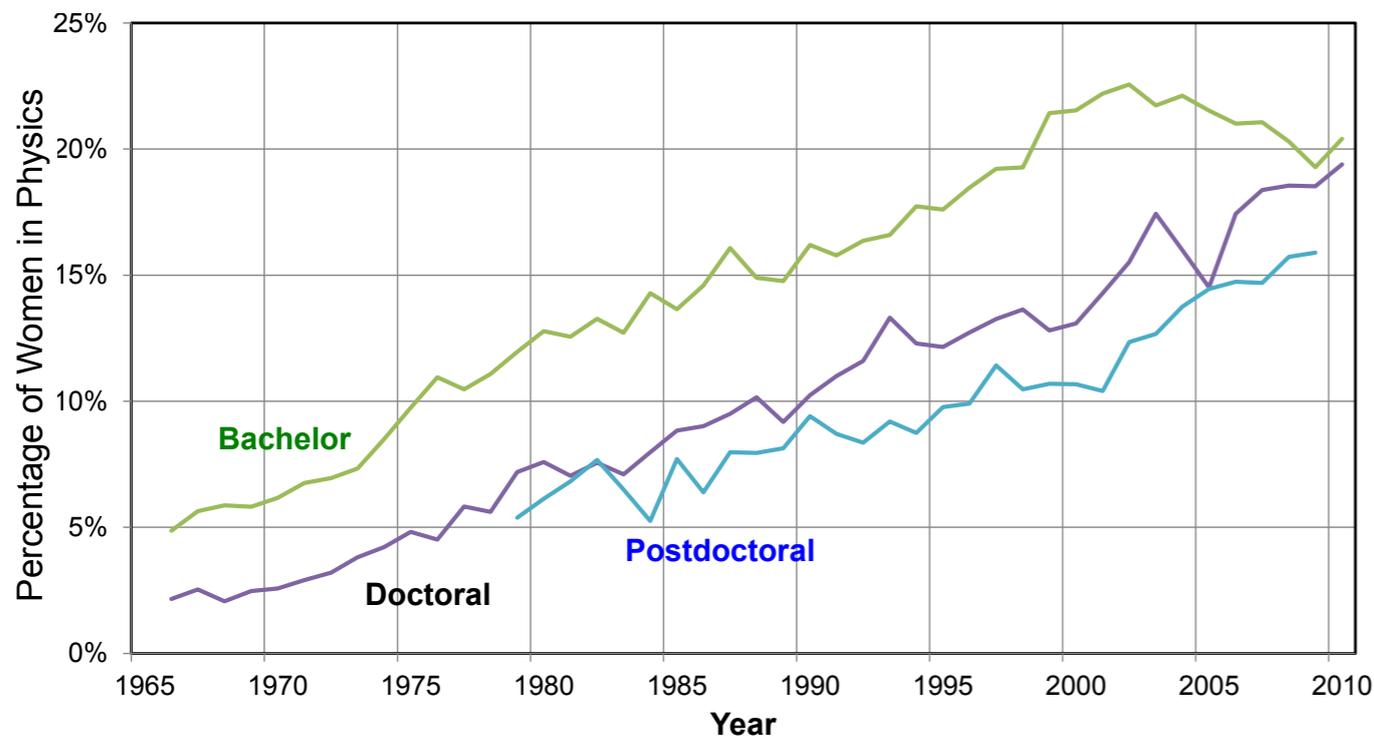
Participation of women in physics

Physics continues to be the least diverse of the sciences

Initiatives to increase the participation of women in physics has had positive results

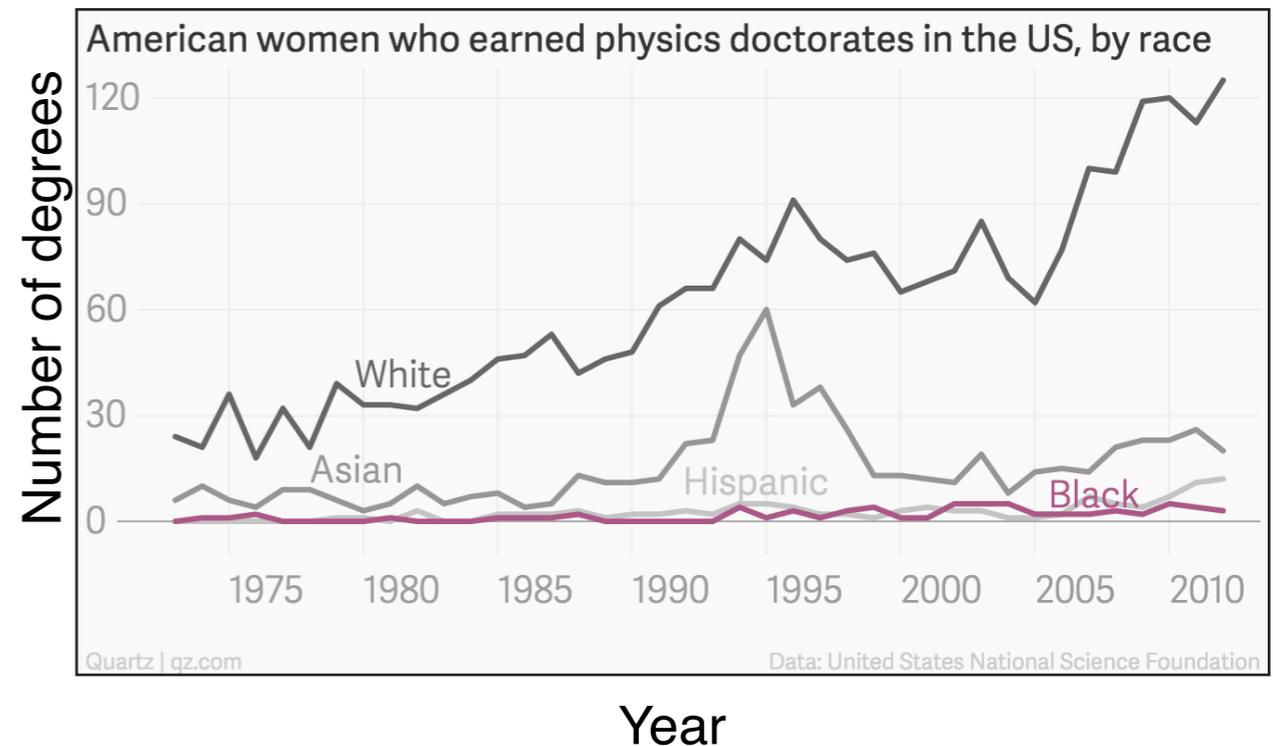
The increase in representation of women that have earned degrees is mostly attributed to the increase of degrees earned by white women

Percentage of women in physics



Credit: APS/Source: IPEDS Completion Survey & NSF-NIH Survey of Graduate Students & Postdoctorates in Science and Engineering

PhD degrees earned by women in physics by race



Quartz | qz.com

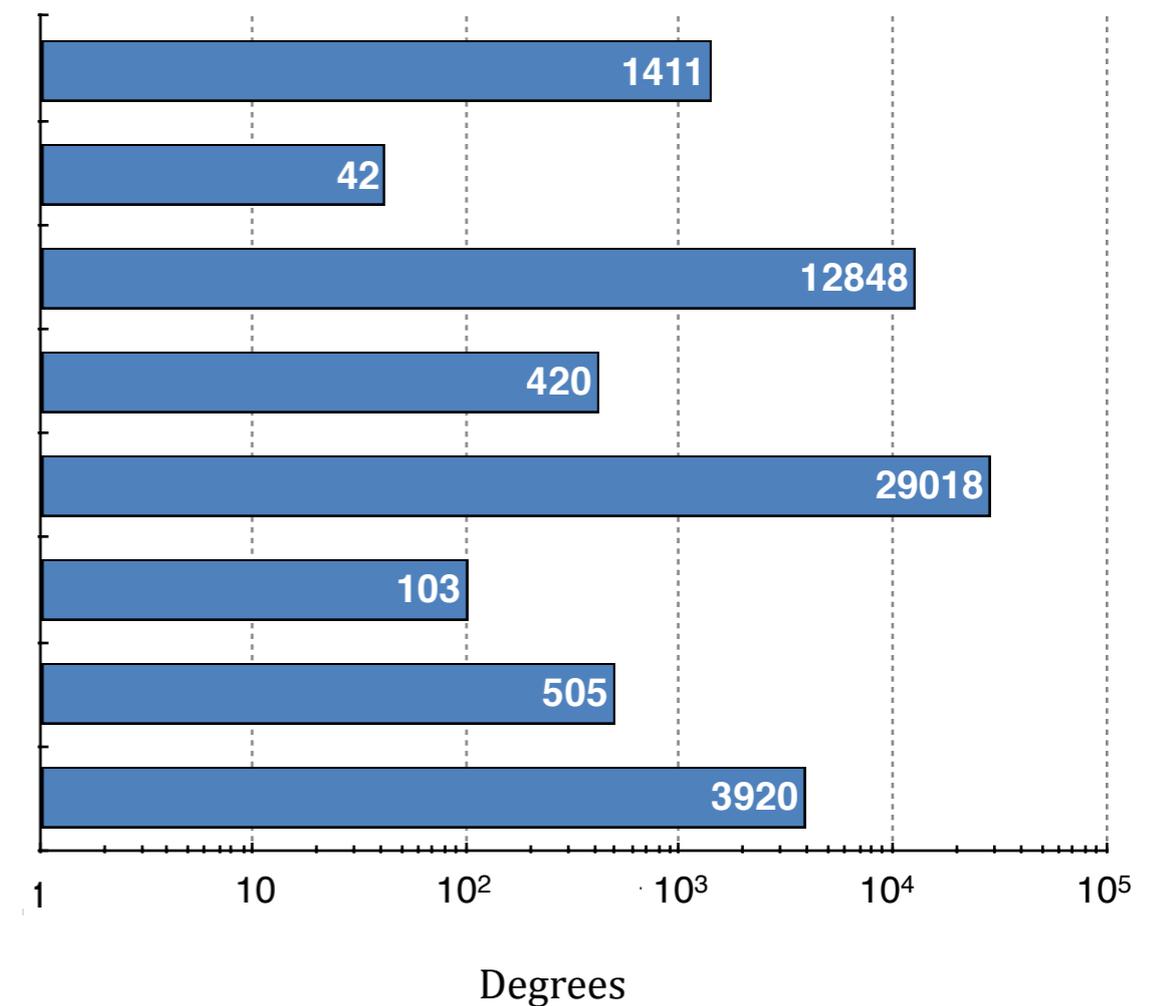
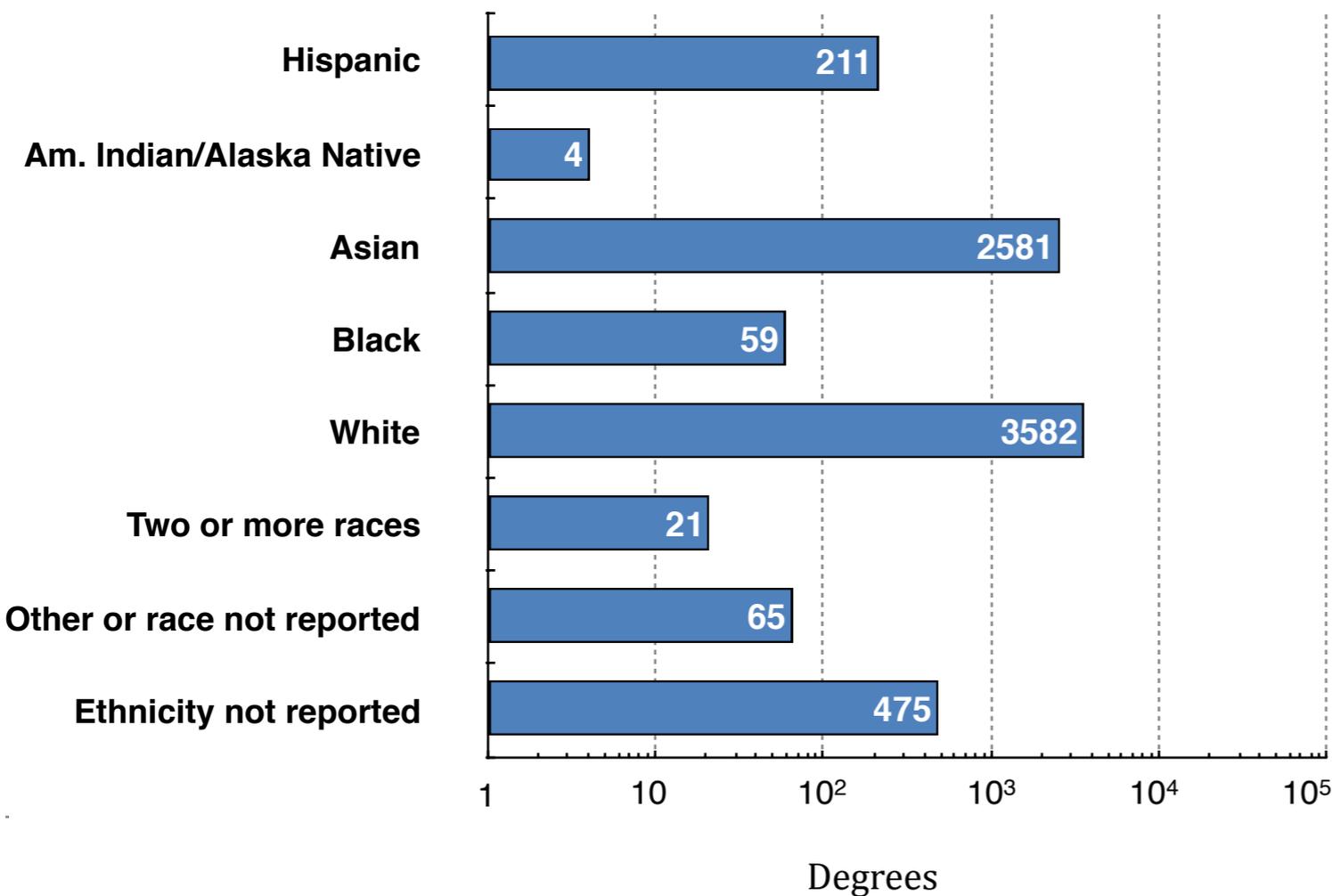
Data: United States National Science Foundation

Putting it in all in perspective

Number of physics degrees earned in physics since 1973 can demonstrate the point

Women who earned physics doctorates (1973-2015)

Men who earned physics doctorates (1973-2015)



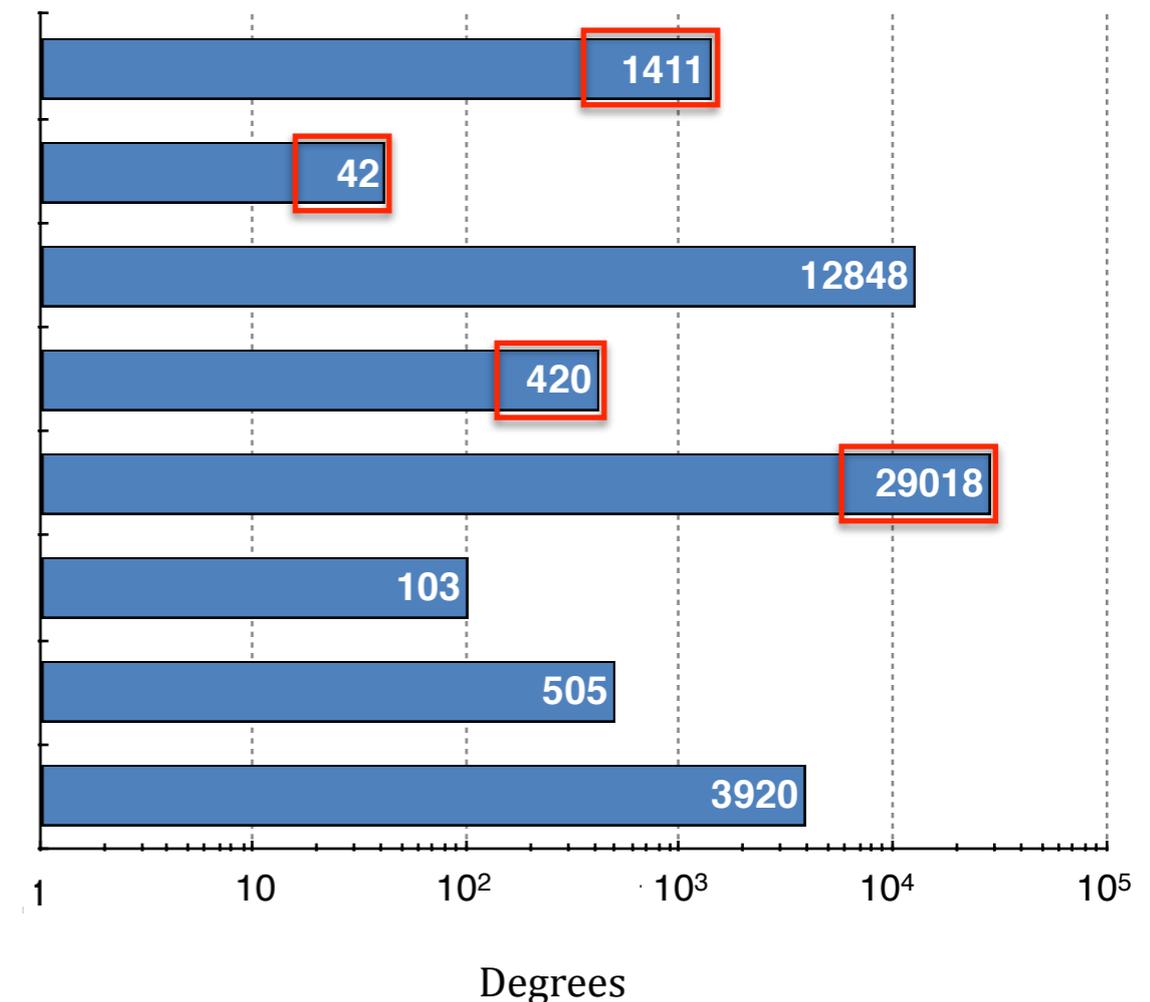
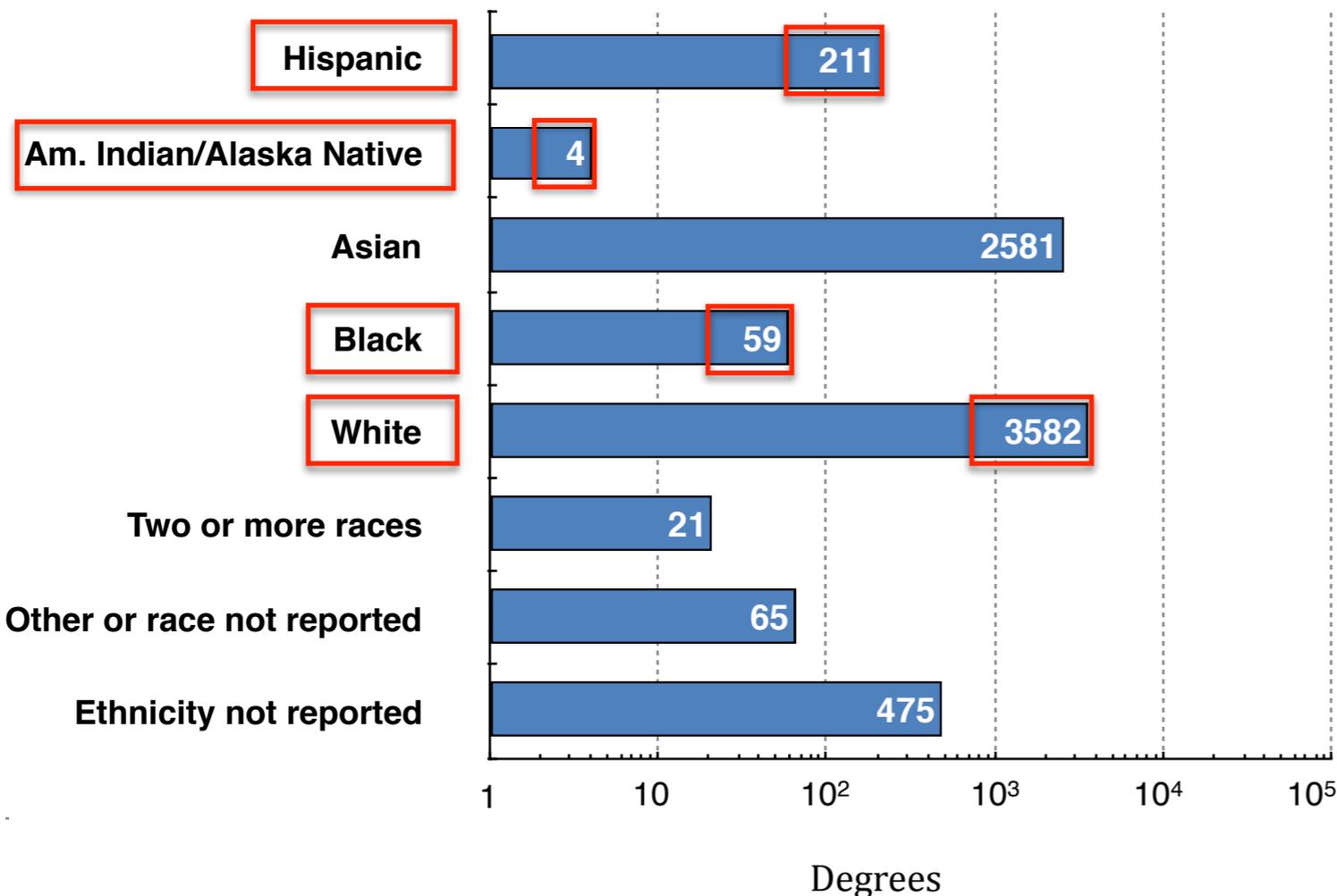
Putting it in all in perspective

Number of physics degrees earned in physics since 1973 can demonstrate the point

Degrees earned by URM men and women are orders of magnitudes below those of white men and women

Women who earned physics doctorates (1973-2015)

Men who earned physics doctorates (1973-2015)



Putting it in all in perspective

The total number of physics PhDs earned by black men is roughly **500** in US History

The total number of physics/astronomy PhDs earned by black women is roughly **100**

This image highlights about 1/5 of all black women with a PhD in physics/astronomy



Addressing diversity

Guiding Questions?

Is the current level of representation of people from diverse backgrounds acceptable? If not, is it solvable?

What can we as a community do to address it?

How do we make it sustainable?

Initiatives

American Physical Society (APS)

- ◎ CSWIP and CUWiP

- ▶ committed to encouraging the recruitment, retention, and career development of women physicists at all levels.

- ◎ COM

- ▶ addresses the production, retention, and career development of minority physicists and gathers and maintains data on minorities in physics in support of these objectives

- ◎ National Mentoring Community (NMC) is a program to increase the number of underrepresented ethnic/racial minority students who complete Bachelor's degrees in physics.

- ◎ LGBTQ+: Ad Hoc Committee on LGBT Issues (C-LGBT)

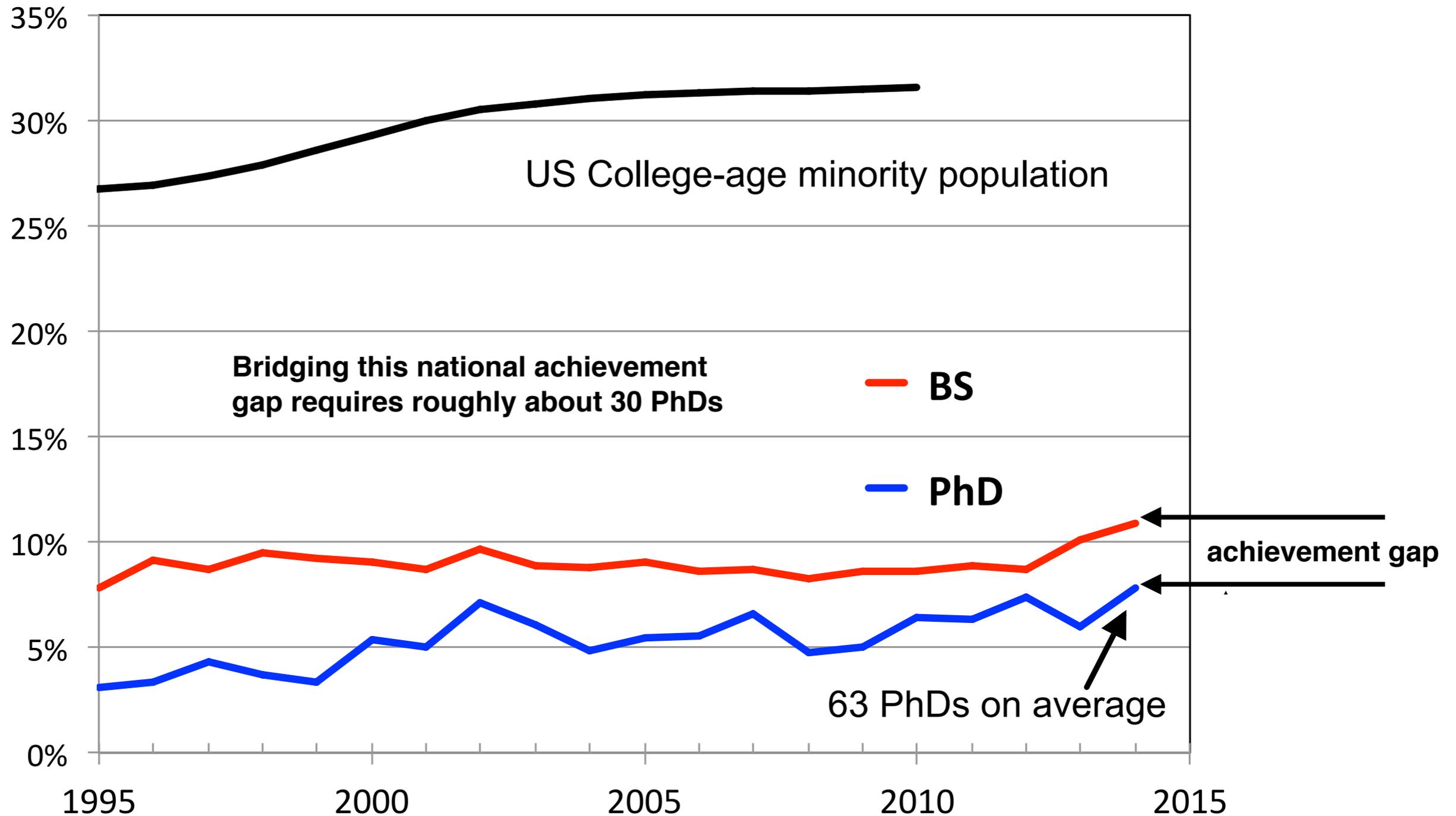
Initiatives

American Institute of Physics (AIP)

- Liaison Committee on Underrepresented Minorities (LCURM)
 - ▶ Composed of a designee for nine of the ten AIP member societies and from NSBP, NHSP, and SPS
 - ▶ Specifically focused on increasing the percentage of African American who received BS in physics and astronomy

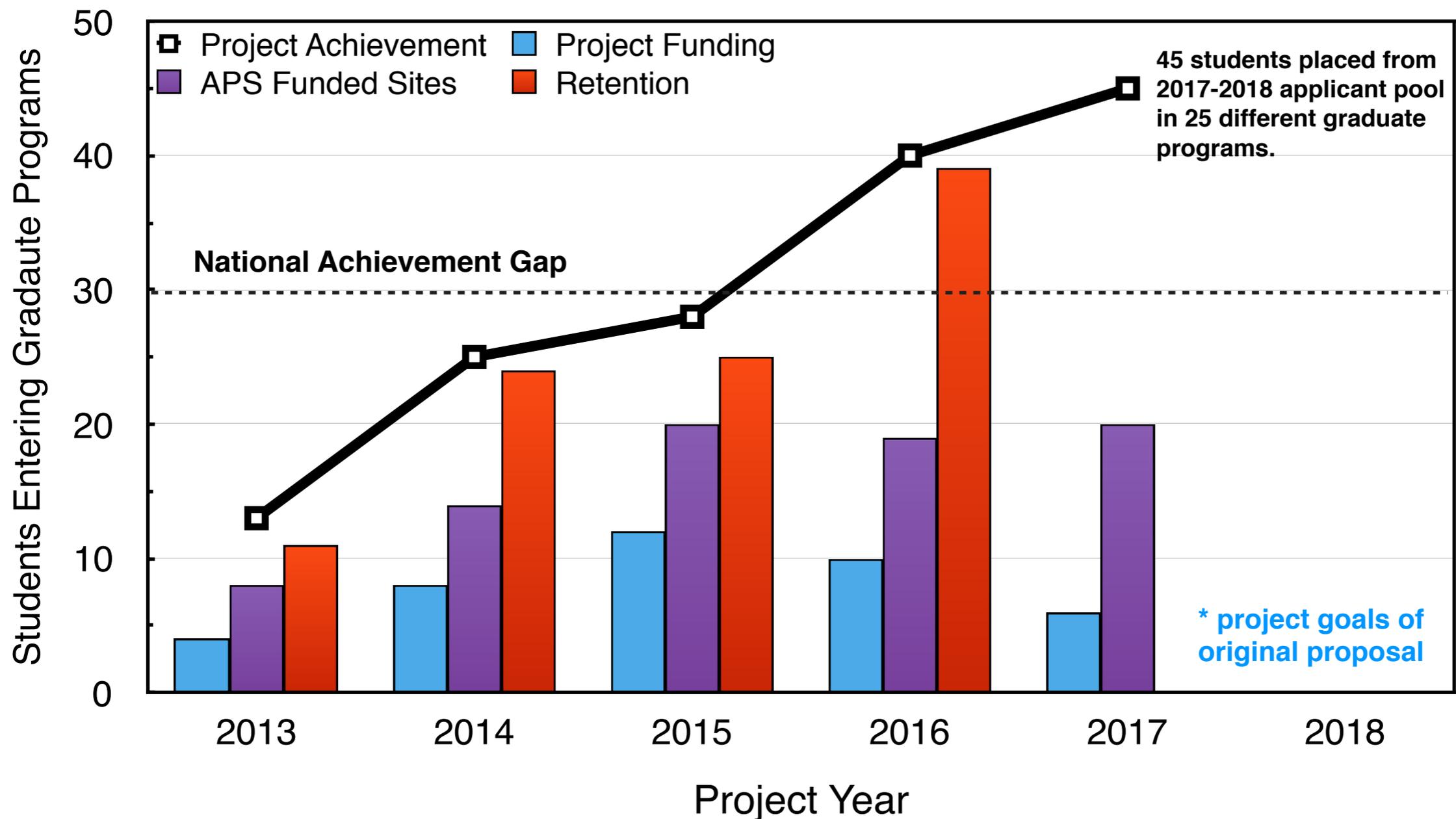
URM trends in physics

Percentage of degrees earned by URM in Physics



APS Bridge Program outcomes

Roughly 150 students have been placed into Bridge or Graduate programs in physics.



These students would have entered graduate school !

Bridge program achievements

Retention rates in physics graduate programs

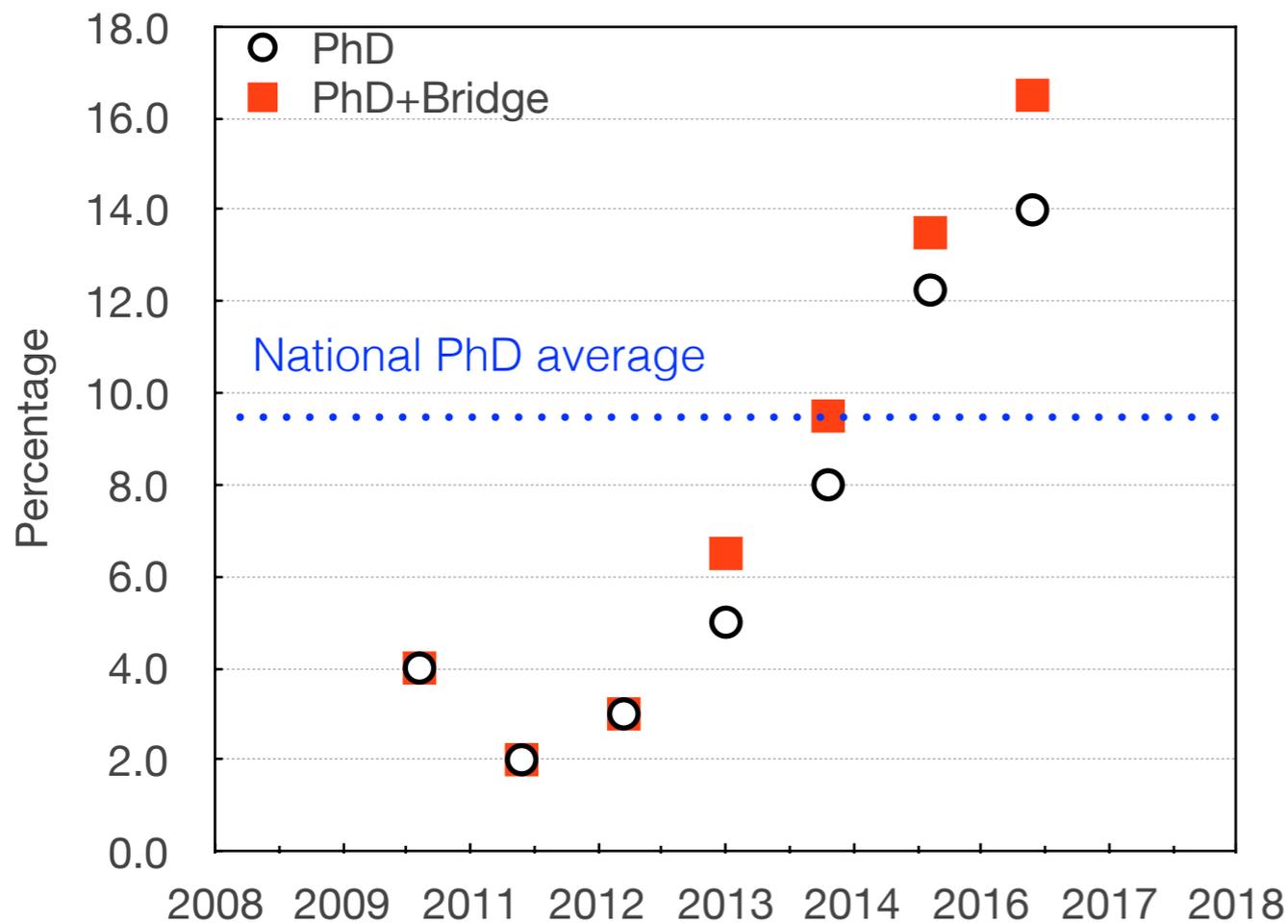
- National Average **~60%**
- APS **~ 93% retained**
- Fisk-Vanderbilt **~90% retained**. Started in 2004, the program has admitted 112 students, **90%** of them underrepresented minorities (**45%** female)

Conclusion/Outlook

Bridge Programs can provide for students from diverse backgrounds the opportunity to excel and become scientists, leaders, and role models of the future.

Implemented best practices can increase diversity in student enrollment and retention, and ultimately the physics community

OSU Physics Graduate Program Diversity



Dr. Jedidah Isler

First black woman to earn PhD in astrophysics from Yale university was part of the Fisk-Vanderbilt bridge program

Dr. Brittany Kamai

First native Hawaiian woman to earn PhD in physics was part of the Fisk-Vanderbilt bridge program



Change will not come if we wait for some other person or some other time. We are the ones we've been waiting for. We are the change we seek.

-Barack Obama

Supplemental

Terms

Diversity: Increasing the presence, recognition, understanding, and positive impact of diversity

Equity: Actively challenging and responding to bias, harassment, discrimination, and inequity

Inclusion: Every individual is valued and feels a sense of belonging and inclusion

Accessibility: Enable full participation for all

Intersectionality

Intersectionality: Two or more identities that impact each other

Diversity and inclusiveness initiatives must acknowledge intersectionality of:

- Racial/ethnic identity with Gender and Sexual Minorities (GSM),
- Members of the LGBTQ+ community
- Disabled
- Non-traditional students

Goals of APS Bridge Program

APS Bridge Program - National effort to increase the number of PhD earned by underrepresented students in physics.

- Increase the fraction of physics PhDs Awarded to underrepresented minority students to match the fraction of physics bachelors awarded
- Develop, evaluate, and document sustainable bridging experiences that improve the access to the culture of graduate education for all students, with emphasis on underrepresented groups in doctoral physics programs
- Promote and disseminate successful program components to the physics community

Bridge programs in physics

Bridge Program -

- An approach to addressing the underrepresentation of some groups in physics
- Aimed at providing opportunities for students to be successful that may not have had such chances by traditional means

APS Funded Sites:

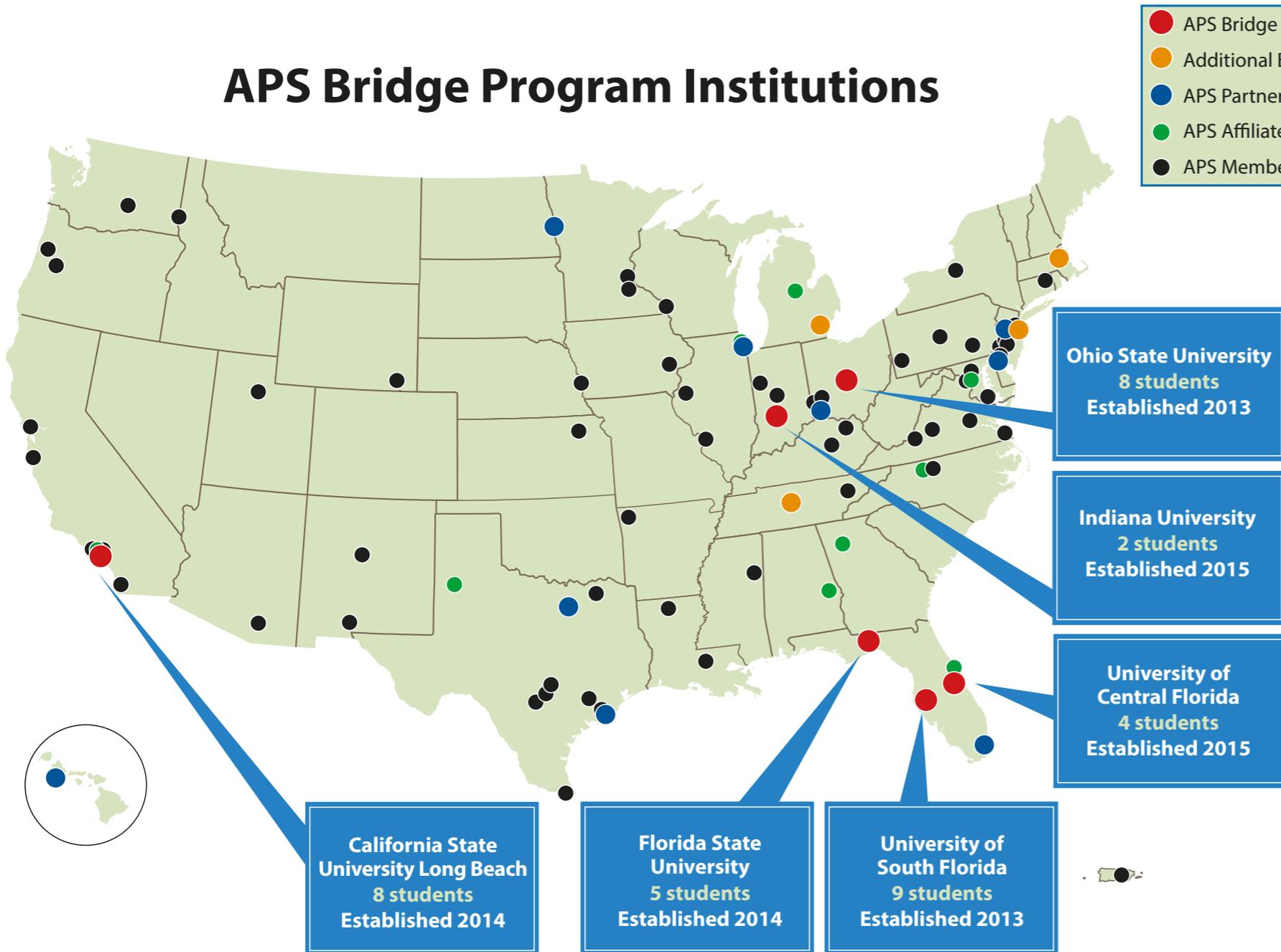
- Florida State University
- Indiana University
- Ohio State University
- University of Central Florida
- University of South Florida
- Cal. State Long Beach

Other Programs:

- University of Michigan
- Columbia University
- Fisk/ Vanderbilt University
- MIT
- **Princeton University**
- **University of Chicago**
- Others under development

Bridge programs in physics

APS Bridge Program Institutions



- Member Institutions
 - ▶ 93 in 36 states
- Partner Institutions
 - ▶ 19 in 14 states
- Bridge Sites:
 - ▶ Pre-existing: 4
 - ▶ APS: 6
 - ▶ In development: 4

Bridge Program best practices

Faculty involvement

- 10-15% tenure faculty involvement needed for sustainability

Admissions decisions (holistic approach)

- Decide what are you selecting for? Success? (“Holistic review”)

Initial placement

- Academic preparation and skills assessment
- Honest self assessment by student

Financial support

- Secure funding for at least one year for bridging experience (timing)

Mentoring

- Mentor-mentee compact outlining expectations, and multiple mentors (including peer mentoring)

Bridge Program best practices

Coursework

- Flexibility in courses and usage of cross listed courses (induction advising and alternate plan)

Progress monitoring and inductions

- Introduction into graduate life and new culture
- Weekly progress meetings (timing, intervention)

Research

- Appropriate match in research interest. Having a mentoring support system means a poor lab environment does not have to be ruled out

Retention best practices

Mentoring

- Faculty seeking to become better mentors
 - ▶ Training on culturally sensitive mentoring
 - ▶ Seek others that could be a mentor in a way that you are unable
- Wrap-around mentoring model
 - ▶ Peer mentors, PD mentors, advisors, coordinators, mentors outside of department
 - ▶ Research evaluation rubric to get feedback on progress

Retention best practices

Mentoring

- Professional development seminars
 - ▶ Stereotype threat, imposter syndrome, time management, mental health, care and feeding your advisor, and pushing through to graduation
- Preparation for career
 - ▶ Practice for interview talks
 - ▶ Job negotiation skills

Resources

AIP Statistical Research Center: aip.org/statistics

APS Bridge Program : www.apsbridgeprogram.org

Fisk-Vanderbilt Bridge Program: fisk-vanderbilt-bridge.org

University of Michigan Bridge Program: [Michigan Imes-Moore Fellows program](#)

Stereotype Threat: www.reducingstereotypethreat.org

Holistic Admissions: http://cgsnet.org/ckfinder/userfiles/files/CGS_HolisticReview_final_web.pdf